MONITORING WELL INSTALLATION REPORT
PIEDMONT LANDFILL & RECYCLING CENTER
KERNERSVILLE, NORTH CAROLINA

Carper Johnson

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DECEMBER 1994

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PREPARED BY:

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December 16, 1994

Mr. Edward Gibson
Piedmont Landfill and Recycling Center
9900 Freeman Road
Kernersville, North Carolina 27284

Subject: Monitoring Well Installation Report for System Upgrade
Piedmont Landfill and Recycling Center
Kernersville, North Carolina
RUST Project No. 32066.200

Dear Mr. Gibson:

The following report describes the additional well installation for the ground-water monitoring system upgrade at the landfill. We appreciate this opportunity to work with you, and if you should have any questions please do not hesitate to call me at (803) 234-2261.

Sincerely,

Peter J. Walls, P.G., P.E.
Senior Geological Engineer

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1.0 INTRODUCTION

Waste Management of Carolinas, Inc. (WMCI) operates the Piedmont Landfill and Recycling Center (PLRC). PLRC is located approximately ten miles north of Kernersville, North Carolina, in the northeast corner of Forsyth County. Access to the site is by Goodwill Church - Freeman Road. The current operating landfill occupies a footprint of approximately 38 acres. This report presents the results of the installation of five additional ground-water monitoring wells for the monitoring system upgrade as per the Water Quality Monitoring Plan for the Unconstructed Portion.

2.0 OBJECTIVES AND SCOPE

The Water Quality Monitoring Plan for the Unconstructed Portion required the installation of five additional new ground-water monitoring wells, MW-10, MW-11, MW-11D, MW-12; and MW-12D. Three of the five wells were installed within 100 feet from the waste boundary, between the waste boundary and the property boundary. However, wells MW-12 and MW-12D were installed about 170 feet from the proposed waste boundary because a major roadway (Freeman Road) and drainage ditch were located within 100 feet of the waste boundary.

Three 15-foot monitoring well screens were placed at vertical locations for MW-10, MW-11 and MW-12 that would ensure that future drought conditions, which may lower the water table, would not render the monitoring system ineffective.

During October and November 1994, these the shallow monitoring wells (MW-10, MW-11, and MW-12) were installed such that screens were set 1-foot above the seasonal high water table as established in the Water Quality Monitoring Plan. The two deep wells were installed in the saprolite just above bedrock. These wells were set in the residuum/saprolite where first contamination is anticipated to be encountered.

3.0 INSTALLATION

3.1 Soil Test Boring

Standard soil test borings were drilled at the three designated monitoring locations. The soil test borings were advanced into the residuum/saprolite with a 6-1/4 and 4-1/4 inch I.D. hollow-stem augers and sampled using a split spoon sampler at 5-foot intervals. Borings MW-11 and MW-12 encountered auger refusal at 93.5-feet and 43.3 feet respectively. Drilling was stopped there and the well was set. The soil samples were logged for classification purposes. The two shallow wells were set in saprolite in adjacent borings.

3.2 Monitoring Wells

The three boring locations had five ground-water monitoring wells installed at them. The following paragraph describes the installation methods used. A summary of monitoring well construction data is presented in the table. Detailed monitoring well construction logs are included in Appendix B and state well completion records in Appendix C.

Monitoring wells were installed in accordance with the following procedures. All well screens and risers were steam cleaned and the length of each section was measured to the nearest 0.01 foot immediately prior to installation. Personnel handling well materials were required to wear new disposable latex gloves. Well screens and risers for each well consisted of 2.0-inch I.D., flush threaded, Schedule 40 polyvinyl chloride (PVC). Screens were 15 feet in length for the three shallow wells and 10 feet for the two deep wells with 0.010-inch machined slots. Filter pack material, consisting of a washed medium/fine silica sand, was installed to approximately 1-foot above the top of each well screen. Another foot of washed fine silica sand was placed above the coarser sand pack to act as a filter. Then at least a 3-foot thick bentonite pellet seal was placed above the sands and allowed to hydrate for approximately 3/4 hour. Another 6-inch layer of washed fine silica sand was placed above this bentonite seal. Because the top of screen was so shallow in MW-12, some of the minimum thicknesses had to be further reduced to construct a properly functioning monitoring well. Cement-bentonite grout was pumped via tremie pipe from the top of this upper sand layer to the ground surface. The wells were completed with 4-inch lockable

anodized-aluminum protective casings set into a 3 ft. x 3 ft. x 3 in. concrete pads with 4 protective posts.

3.3 Well Development

Each well was developed using both surging with a hand pump and a grundfos submersible pump. Development proceeded over 4 days and the total amount of water removed is recorded on the well construction logs in Appendix B. Water samples were tested periodically until the parameters stabilized within acceptable limits.

3.4 Survey

All proposed locations were staked prior to drilling and then each well was surveyed for their state grid coordinates and the top of PVC casing elevation determined using NGVD. All surveying was performed by a crew from Hugh Creed Associates.

4.0 CONCLUSION

These five ground-water monitoring wells were installed with three at the water table and two at the top of rock. All were set in residuum/saprolite as per the Water Quality Monitoring Plan for the Unconstructed Portion. The wells were installed in general accordance with both Waste Management and the North Carolina Well Construction Standards (15A NCAC 2C.0108).

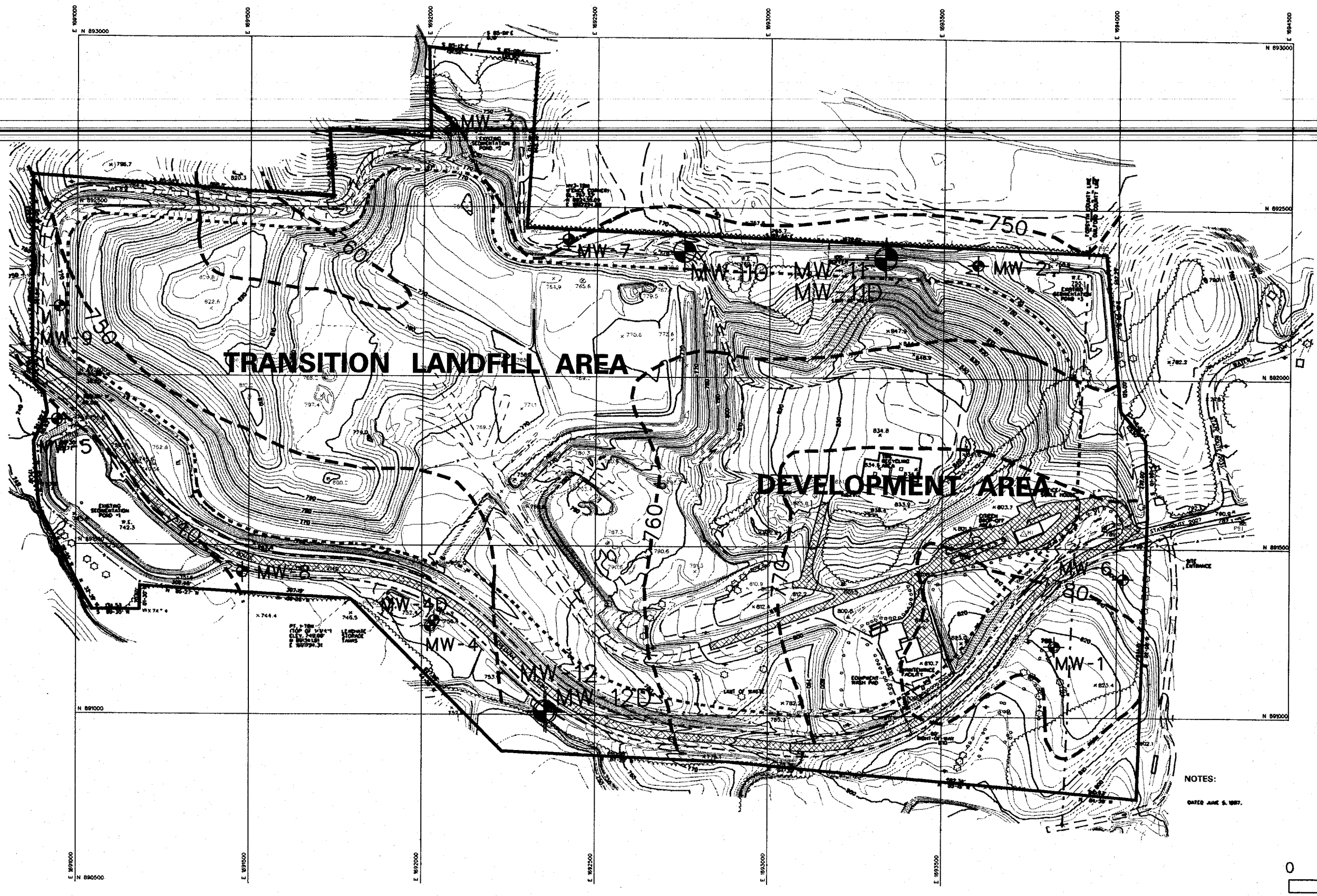
The summary of hydrogeologic characteristics at each well are described as follows. At MW-10, the soils have a porosity of 47 percent and an hydraulic conductivity of 10^{-4} cm/sec. The effective porosity is estimated to be 30 percent. The ground-water flow is then estimated to be 8.6 feet/year in a northerly direction. At MW-11, the soils have a porosity of 55 percent and an hydraulic conductivity of 10^{-4} cm/sec. The effective porosity is estimated to be 30 percent. The ground-water flow is then estimated to be 8.6 feet/year in a northerly direction. At MW-11D, the soils have a porosity of 37 percent and an hydraulic conductivity of 10^{-4} cm/sec. The effective porosity is estimated to be 25 percent. The ground-water flow is then estimated to be 10 feet/year in a northerly direction. At MW-12 the soils have a porosity of 49 percent and an hydraulic conductivity of 10^{-4} cm/sec. The

effective porosity is estimated to be 30 percent. The ground-water flow is then estimated to be 7.2 feet/year in a west-southwesterly direction. At MW-12D the soils have a porosity of 39 percent and an hydraulic conductivity of 10^{-6} cm/sec. The effective porosity is estimated to be 20 percent. The ground water flow is then estimated to be 0.1 feet/year, in a west-southwesterly direction.

TABLE 1

MONITORING WELL CONSTRUCTION DETAILS
PIEDMONT LANDFILL & RECYCLING CENTER
KERNERSVILLE, NORTH CAROLINA

Monitoring Well	State Coordinates	Ground Elevation	T.O.C. Elevation	Screen Elevation (Depth)	Sand Pack Elevation (Depth)	Top of Bentonite Seal
MW-10	N 892,371.2 E 1,692,751.8	774.20	777.20	752.20-737.21 (22.00-36.99)	754.90-736.2 (19.3-38.00)	758.60 (15.60)
MW-11	N 892,349.7 E 1,693,332.9	774.30	776.80	755.29-740.30 (19.01-34.00)	757.20-739.3 (17.1-35.00)	761.60 (12.7)
MW-11D	N 892,356.00 E 1,693,334.00	773.86	776.36	692.04-682.07 (81.82-91.79)	693.86-680.36 (80.0-93.5)	698.86 (75.0)
MW-12	N 891,010.98 E 1,692,354.73	748.58	751.48	745.25-731.55 (3.33-17.03)	746.83-730.58 (1.75-18.00)	748.08 (0.50)
MW-12D	N 891,007.53 E 1,692,360.86	748.73	751.53	716.75-706.73 (31.98-42.00)	724.23-705.43 (24.5-43.3)	735.23 (13.5)



LEGEND:

- 750 — POTENTIONMETRIC CONTOUR SEASONAL HIGH (10 FT. INTERVAL)
- GROUND WATER MONITORING WELL INSTALLED OCTOBER/NOVEMBER 2004
- EXISTING GROUND WATER MONITORING WELL

NOTES:

DATED JUNE 5, 1987.

0 300 600 900

SCALE IN FEET

RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE
GROUND WATER MONITORING
WELL LOCATIONS

PIEDMONT LANDFILL AND RECYCLING CENTER
FORSYTH COUNTY, NORTH CAROLINA
PROJECT NO. 32066.200

APPENDIX A
SOIL BORING LOGS

SOIL BOREHOLE LOG

SITE NAME AND LOCATION PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC	DRILLING METHOD: 6.25" I.D. HOLLOW STEM AUGER		BORING NO. MW-10
	SAMPLING METHOD: SPLIT SPOON		SHEET 1 OF 2
DATUM	ELEVATION 774.0		DRILLING START TIME 09:20 DATE 10-24-94; FINISH TIME 14:45 DATE 10-24-94
DRILL RIG CME-850 Track Mount	SURFACE CONDITIONS SOIL/BOULDERS		
ANGLE Vertical	BEARING ------		
SAMPLE HAMMER TORQUE	FT.-LBS		

WATER LEVEL				
TIME				
DATE				
CASING DEPTH				

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER %(RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
0.0	3, 4, 5, 6; 55%		**SILT (ML)** Stiff, brownish orange, dry, mostly silt.								
5	1, 3, 3, 3; 38%		**SILT (ML)** Similar to above, some yellow. - FILL -								
10	3, 3, 3, 3; 75%		**SILT (ML)** Similar to above, none mottled, 11 - 11 1/2 ft. light brown, white saprolite.								
15	4, 5, 5, 4; 83%		**CLAYEY SILT (ML/CH)** Stiff, brownish orange, little yellow and black mottling, moist, mostly silt, little clay, may have graded into severely weathered saprolite.								
20	3, 4, 5, 6; 100%		**CLAYEY SILT (ML/CH)** Similar to above.								
25	ST										
30	5, 7, 13, 15; 100%		**SILT (ML)** Very stiff, dark brown, orange brown, some black mottling, wet, mostly silt, few clay and fine sand, weathered gneiss/schist. - SAPROLITE -								
35.0											

Continued Next Page

DRILLING CONTR GRAHAM & CURRIE

DRILLER

SL

LOGGED BY MICHAEL TAYLOR

CHK'D BY

Tracking 32066, WHSON, 12/16/94, 1704

SOIL BOREHOLE LOG

SITE NAME AND LOCATION: PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC	DRILLING METHOD: 6.25" I.D. HOLLOW STEM AUGER	BORING NO. MW-10	
	SAMPLING METHOD: SPLIT SPOON	SHEET 2 OF 2	
		DRILLING START	DRILLING FINISH
	WATER LEVEL		
	TIME	TIME 09:20	TIME 14:45
	DATE	DATE	DATE
DATUM — ELEVATION 774.0	CASING DEPTH	10-24-94	10-24-94
DRILL RIG: CME-850 Track Mount	SURFACE CONDITIONS: SOIL/BOULDERS		
ANGLE: Vertical — BEARING ------			
SAMPLE HAMMER TORQUE — FT.-LBS			

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER %(RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
35.0	12 24 51 5 63%		**GRAVELY SILT (MG)** Dense, white, medium brown, mottled, wet, mostly silt, some fine to medium gravel (quartz/plagioclase grains).								
			Boring Terminated at 38.0 ft.								
40											
45											
50											
55											
60											
65											
70											

DRILLING CONTR GRAHAM & CURRIE

DRILLER

SL

LOGGED BY MICHAEL TAYLOR

CHK'D BY

SOIL BOREHOLE LOG

SITE NAME AND LOCATION **PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC**	DRILLING METHOD: **8.5" O.D. (4.25" I.D.) HOLLOW STEM AUGER**		BORING NO. **MW-11**
	SAMPLING METHOD: **SPLIT SPOON**		SHEET **1** OF **3**
			DRILLING START / FINISH
	WATER LEVEL		TIME / TIME
	TIME		**13:06** / **11:28**
	DATE		DATE / DATE
DATUM ELEVATION **774.0**	CASING DEPTH		**11-14-94** / **11-15-94**
DRILL RIG **CME-450**	SURFACE CONDITIONS **FILL (BERM OR PHASE 3, CELL 1)**		
ANGLE **Vertical** BEARING ------			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR **ECS** DRILLER

SL

LOGGED BY **MICHAEL TAYLOR**

CHK'D BY

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER %(RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
0.0											
5	4 7 10 11 100%		**GRAVELY SANDY SILT (ML)** Very stiff, grayish brown, dry, mostly silt, little gravel and sand.								
10	1 4 6 6 83%		**SILTY SAND (SM)** Loose, olive brown, dry, mostly sand, some silt, few clay. - FILL -								
15	4 2 2 3 100%		**SILT (ML)** Soft, reddish orange, black, mottled, dry, all silt, weathered fine grained granitic gneiss.								
20	3 3 4 4 75%		**SILT (ML)** Medium stiff, white, black and orange, mottled, dry, mostly silt, few sand, weathered fine grained granitic gneiss.								
25	1 2 5 5 100%		**SANDY SILT (ML)** Medium stiff, orange brown, black and white, mottled, wet, mostly silt, little sand, weathered fine grained granitic gneiss.								
30	2 1 3 3 100%		**SANDY SILT (ML)** Similar to above. - SAPROLITE -								
35											

Continued Next Page

SOIL BOREHOLE LOG

SITE NAME AND LOCATION **PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC**	DRILLING METHOD: **8.5" O.D. (4.25" I.D.) HOLLOW STEM AUGER**		BORING NO. **MW-11**
	SAMPLING METHOD: **SPLIT SPOON**		SHEET **2** OF **3**
			DRILLING START / FINISH
	WATER LEVEL		TIME / TIME
	TIME		**13:06** / **11:28**
	DATE		DATE / DATE
DATUM ELEVATION **774.0**	CASING DEPTH		**11-14-94** / **11-15-94**

DRILL RIG: **CME-450** SURFACE CONDITIONS: **FILL (BERM OR PHASE 3, CELL 1)**

ANGLE: **Vertical** BEARING: ------

SAMPLE HAMMER TORQUE: FT.-LBS

DRILLING CONTR **ECS** DRILLER

SL

LOGGED BY **MICHAEL TAYLOR**

CHK'D BY

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER %(RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
35.0	6 8 13 12 67%		**SANDY SILT (ML)** Very stiff, light tan-brown, wet, mostly silt, some fine sand, few clay, abundant mica in fine to medium laminations.								
40	7 7 12 10 80%		**SANDY SILT (ML)** Very stiff, top 6" and bottom 4" white and black, mottled, middle 9" orangish brown, dark gray, green, white, relict deformation, abundant mica, wet, mostly silt, little fine sand, weathered granitic gneiss, middle portion nearly schistose.								
45	11 15 13 15 100%		**SANDY CLAY (ML)** Very stiff, grayish brown, very mottled and deformed, wet, mostly clay, some fine sand, few silt. **SANDY SILT (ML)** Stiff, black and white, horizontal laminations, wet, mostly silt, some medium sand.								
50	ST										
55	10 13 14 17		**SANDY SILT (ML)** Very stiff, white, black brown, wet/moist, mostly silt, some fine sand, weathered dioritic gneiss with banding of quartz on plagioclase veins, gneiss is fine grained, iron oxidation at boundaries of quartz/plagioclase vein.								
60	*		**SANDY SILT (ML)** Similar to above. * No blows due to rods falling.								
65			- SAPROLITE -								
70.0											

Continued Next Page

SOIL BOREHOLE LOG

SITE NAME AND LOCATION **PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC**

DRILLING METHOD: **8.5" O.D. (4.25" I.D.) HOLLOW STEM AUGER**

SAMPLING METHOD: **SPLIT SPOON**

BORING NO. **MW-11**

SHEET **3** OF **3**

					DRILLING START	DRILLING FINISH
WATER LEVEL					TIME	TIME
TIME					13:06	11:28
DATE					DATE	DATE
CASING DEPTH					11-14-94	11-15-94

DATUM ELEVATION **774.0**

DRILL RIG **CME-450**

SURFACE CONDITIONS **FILL (BERM OR PHASE 3, CELL 1)**

ANGLE **Vertical** BEARING ------

SAMPLE HAMMER TORQUE FT.-LBS

DRILLING CONTR **ECS**

DRILLER

SL

LOGGED BY **MICHAEL TAYLOR**

CHK'D BY

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER %(RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
70.0	7 9 14 26 75%		**SANDY SILT (ML)** Similar to above.								
75	11 15 25 30 65%		**SANDY SILT (ML)** Similar to above, some fine gravel in quartz/plagioclase veins. Iron stained material adjacent to veins is clay and mica.								
80	6 10 13 15 0%		No return, only material from inside augers in split spoon.								
85	7 11 23 33 55%		**GRAVELY SILT (ML)** Hard, orangish brown, white, moist, mostly silt, some fine to coarse gravel, quartz/plagioclase grains, mica in iron stained zones.								
90			**CLAYEY SILT (ML)** Hard, green, white, remenant grains, moist, mostly silt, little clay, green grains altered hornblends.								
95			**Boring Terminated at 93.5 ft.**								
100											
105.0											

Tracking Code: 32068, Wilson, 12/16/94, 10:58

SOIL BOREHOLE LOG

SITE NAME AND LOCATION PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC	DRILLING METHOD: 6.25" I.D. HOLLOW STEM AUGER	BORING NO. MW-12	
	SAMPLING METHOD: SPLIT SPOON	SHEET 1 OF 2	
		DRILLING	
		START	FINISH
	WATER LEVEL	TIME	TIME
	TIME	09:04	16:40
	DATE	DATE	DATE
DATUM ELEVATION 749.0	CASING DEPTH	10-21-94	10-21-94
DRILL RIG CME 850 Track Mount	SURFACE CONDITIONS GRASS/FOREST		
ANGLE Vertical BEARING ------			
SAMPLE HAMMER TORQUE FT.-LBS			

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER %(RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
0.0	3 3 4 7		**SANDY SILT (ML)** Medium stiff, brown, little oange and gray, dry, mostly silt, little fine to medium quartz sand, little mica few roots.								
5	1 1 2 3		**SILTY CLAY (CL)** Soft, gray, moist to wet, mostly clay, some silt, little fine sand, little mica, 2" fine gravel layer.								
10	1 2 1 2		**SILTY SAND (SM)** Similar to above, but wet. **SILTY SAND (SM)** Very stiff, dark gray brown, wet, fine sand with silt, some mica grading into. - SAPROLITE -								
15	22 47 50/4"		**SANDY SILT (ML)** Dense, brown with white and black, mottling, wet, mostly silt with medium to coarse sand, 6 veins of quartz and plagioclose, black appears to be weathered amphibole, relic textures, saprolite.								
20											
25	1 5 9 8		**SILTY SAND (SM)** Medium stiff, brownish black, wet, mostly fine grained sand, little medium grain sand, little silt, quartz amphibole and mica grain.								
30	50/3"		**SILTY GRAVEL (GM)** Very dense, brown, black mottled white, moist, mostly fine gravel, some silt, little sand, with few mica. - SAPROLITE -								
35.0											

Continued Next Page

DRILLING CONTR GRAHAM & CURRIE
DRILLER
SL
LOGGED BY MICHAEL TAYLOR
CHK'D BY

SOIL BOREHOLE LOG

SITE NAME AND LOCATION **PIEDMONT LANDFILL & RECYCLING CENTER - KERNERSVILLE, NC**	DRILLING METHOD: **6.25" I.D. HOLLOW STEM AUGER**		BORING NO. **MW-12**
	SAMPLING METHOD: **SPLIT SPOON**		SHEET **2** OF **2**
			DRILLING START TIME **09:04** DATE **10-21-94**
	WATER LEVEL / TIME / DATE / CASING DEPTH		DRILLING FINISH TIME **16:40** DATE **10-21-94**
DATUM ELEVATION **749.0**			
DRILL RIG **CME 850 Track Mount**	SURFACE CONDITIONS **GRASS/FOREST**		
ANGLE **Vertical** BEARING **------**			
SAMPLE HAMMER TORQUE FT.-LBS			

DRILLING CONTR **GRAHAM & CURRIE** DRILLER

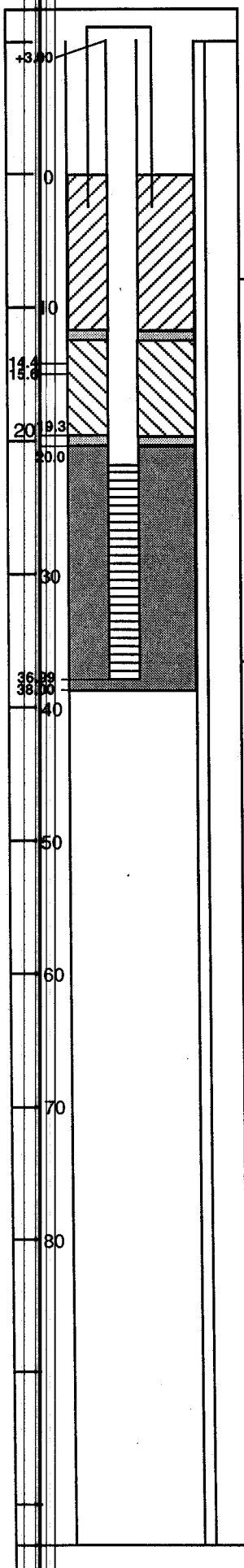
SL

LOGGED BY **MICHAEL TAYLOR**

CHK'D BY

DEPTH IN FEET (ELEVATION)	BLOWS/6 IN ON SAMPLER %(RECOVERY)	SOIL GRAPH	SAMPLE NUMBER AND DESCRIPTION OF MATERIALS	SAMPLER AND BIT	CASING TYPE	BLOWS/FOOT ON CASING	WATER CONTENT %	LIQUID LIMIT %	PLASTIC LIMIT %	SPECIFIC GRAVITY	OTHER TESTS: K cm/sec
35.0			**SILTY GRAVEL (GM)** Very dense, brown, black mottled white, moist, mostly fine gravel, some silt, little sand, with few mica.								
40			- SAPROLITE -								
			Boring terminated at 43.3 ft.								
45											
50											
55											
60											
65											
70.0											

APPENDIX B
MONITORING WELL CONSTRUCTION SUMMARY



Well No.: MW-10

Boring No. X-Ref: MW-10

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N892,371.2
E1,692,751.8

Elevation Ground Level: 774.20

Top of Casing: 777.20

SITE NAME: PIEDMONT LANDFILL

LOCATION: KERNERSVILLE, NC

Drilling Summary:

Total Depth: 38.0 ft.
Borehole Diameter: 11 in.
Casing Stick-up Height: 3.00 ft.
Driller: Graham & Currie

Rig: CME-850
Bit(s): 6.25" I.D. HSA

Drilling Fluid: N/A

Protective Casing: 5.0' x 4.0" x 4.0" Anodized Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling HSA	10/24/94	09:20	10/24/94	14:45
Geophys. Logging:				
Casing:	10/24/94	14:46	10/24/94	14:48
Filter Placement:	10/24/94	14:50	10/24/94	16:04
Bentonite Seal:	10/24/94	16:06	10/24/94	16:32
Development:	11/15/94	08:03	11/17/94	15:12

Well Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____
Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
____ - ____	C_1	____ - ____
22.00 - +3.00	C_2	752.20 - 777.20
36.99 - 22.00	S_1	737.21 - 752.20
37.19 - 36.99	P_1	737.01 - 737.21
____ - ____		____ - ____

Casing: C1 5' x 4" x 4" Anodized Aluminum
C2 2" I.D. Flush Threaded Sch. 40 PVC

Screen: S1 2.0" I.D. 0.010" Slot Sch. 40 PVC
P1 2.0" I.D. PVC Plug

Filter Pack: 38 - 20.8 Med. Sand
20.8 ft. 19.3 Fine Sand
15.6 - 14.4 Fine Sand

Grout Seal: 14.4 to 0.0 ft. Bentonite/ cement grout

Bentonite Seal: 19.3 ft. to 15.6 ft. Bentonite pellets

Well Development:

11/15/94 08:03 - 18:00, Displacement Pump (0.3)
11/17/94 14:42 - 15:12, Grundfos Pump (0.4)

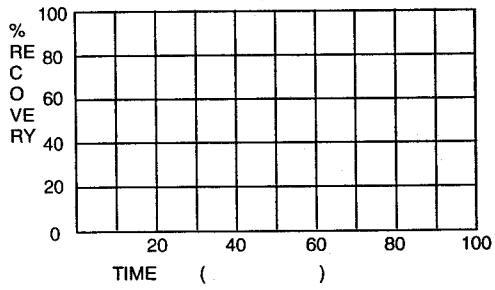
Total pumped approximately 200 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
14:45	5.64	78	14
14:50	5.64	77	15
14:55	5.53	77	15
15:00	5.52	77	15

Recovery Data: None

Q= S_o =



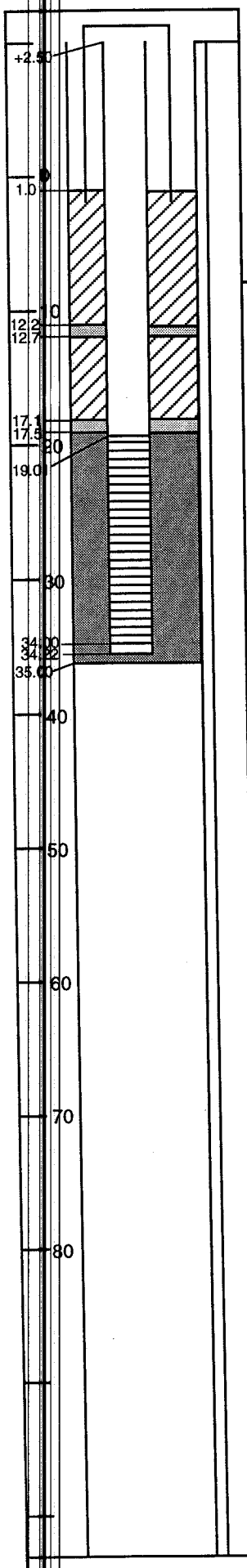
SUPERVISED BY: MIKE TAYLOR

DATE: 10/25/94

WC

Comments:

Water cleaned up after surging well during development.



Well No.: MW-11

Boring No. X-Ref: MW-11

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N892,349.7
E1,693,332.9

Elevation Ground Level: 774.30

Top of Casing: 776.80

SITE NAME: PIEDMONT LANDFILL

LOCATION: KERNERSVILLE, NC

Drilling Summary:

Total Depth: 35.0 ft.
Borehole Diameter: 8.5 in.
Casing Stick-up Height: 2.50 ft.
Driller: ECS

Rig: CME-45
Bit(s): 8.25" I.D. HSA

Drilling Fluid: N/A

Protective Casing: 5.0' x 4.0" x 4.0" Anodized Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling	11/17/94	07:55	11/17/94	09:56
Geophys. Logging:				
Casing:	11/17/94	10:05	11/17/94	10:07
Filter Placement:	11/17/94	10:12	11/17/94	11:04
Bentonite Seal:	11/17/94	11:10	11/17/94	11:20
Development:	11/18/94	14:30	11/18/94	16:32

Well Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____
Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
____ - ____	C1	____ - ____
19.01 - +2.50	C2	755.29 - 776.80
34.00 - 19.01	S1	740.30 - 755.29
34.22 - 34.00	P1	740.08 - 740.30
____ - ____		____ - ____

Casing: C1 5' x 4" x 4" Anodized Aluminum
C2 2 in. I.D. Flush Threaded Sch. 40 PVC

Screen: S1 2.0" I.D. 0.010" Slot Flush Threaded Sch. 40 PVC
P1 2.0" I.D. Flush Threaded Sch. 40 PVC

Filter Pack:
35.0 - 17.5 Med. Sand
17.5 ft. - 17.1 Fine Sand
12.7 - 12.2 Fine Sand

Grout Seal: 12.2 to 1.0 ft. Bentonite Quik gel/cement mix

Bentonite Seal: 17.1 ft. to 12.7 3/8 ft. Bentonite pellets

Well Development:

11/18/94 14:30 - 16:32, Displacement Pump (0.3)

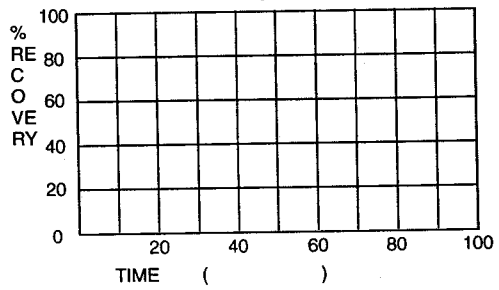
Total pumped approximately 40 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
15:35	6.76	72	15
15:47	6.54	69	15
16:15	6.53	71	15
16:23	6.57	67	15

Recovery Data: None

Q= S_o =



Comments:

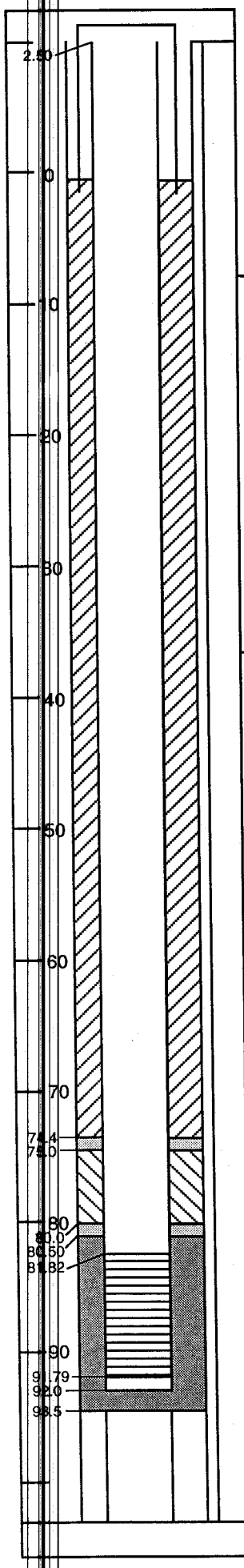
Water cleaned up after surging well during development.

SUPERVISED BY: MIKE TAYLOR

DATE: 11/17/94

WC

CWM Mont. Well



Well No.: MW-11D

Boring No. X-Ref: MW-11

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N892,356.00
E1,693,334.00

Elevation Ground Level: 773.86

Top of Casing: 776.36

SITE NAME: PIEDMONT LANDFILL

LOCATION: KERNERSVILLE, NC

Drilling Summary:

Total Depth: 93.5 ft.
Borehole Diameter: 8.5 in.
Casing Stick-up Height: 2.50 ft.
Driller: ECS

Rig: CME-450
Bit(s): 8.5" I.D. HSA

Drilling Fluid: N/A

Protective Casing: 5.0' x 4.0" x 4.0" Anodized Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling HSA	11/14/94	13:06	11/15/94	11:28
Geophys. Logging:				
Casing:	11/15/94	13:16	11/15/94	13:20
Filter Placement:	11/15/94	17:01	11/16/94	13:53
Bentonite Seal:	11/16/94	14:06	11/16/94	14:18
Development:	11/18/94	07:26	11/18/94	13:35

Well Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____
Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
____ - ____	C1	____ - ____
81.82 - +2.50	C2	692.04 - 776.36
91.79 - 81.82	S1	682.07 - 692.04
92.00 - 91.79	P1	681.86 - 682.07
____ - ____		____ - ____

Casing: C1 5' x 4" x 4" Anodized Aluminum
C2 2" I.D. Flush Threaded Sch. 40 PVC

Screen: S1 2.0" I.D. 0.010" Slot Flush Threaded Sch. 40 PVC
P1 2.0" I.D. Flush Threaded Sch. 40 PVC

Filter Pack:
93.5 ft. - 80.5 ft. Medium Sand
80.5 ft. - 80.0 Fine Sand
75.0 - 74.4 Fine Sand

Grout Seal: 174.4 to 1.0 ft. Bentonite/cement

Bentonite Seal: 80.0 ft. to 75.0 ft. Bentonite pellets (3/8" hole plug)

Well Development:

11/18/94 07:26 - 13:35, Displacement Pump (0.1)

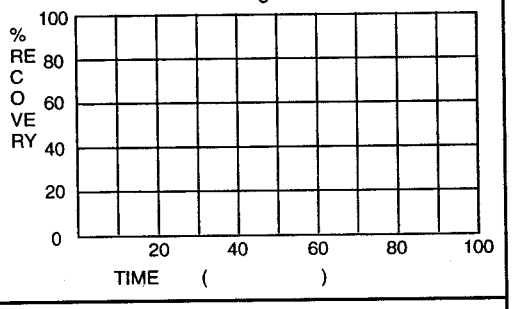
Total pumped approximately 40 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
08:00	7.08	109	18
08:25	6.85	84	15
08:37	7.07	83	16
10:30	6.93	70	16
10:54	6.94	70	16
12:13	6.98	64	16

Recovery Data: None

Q= S_o =



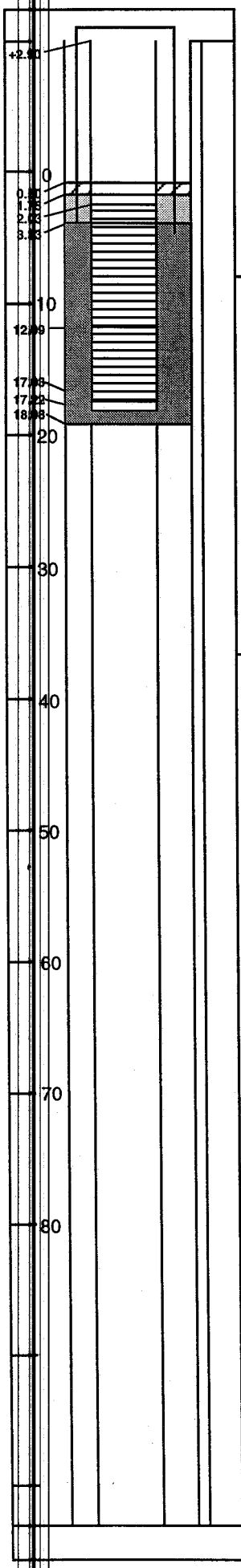
SUPERVISED BY: MIKE TAYLOR

DATE: 11/15/94

WC

Comments:

Water did not really clear up during development.



Well No.: MW-12

Boring No. X-Ref: MW-12

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N891,010.98
E1,692,354.73

Elevation Ground Level: 748.58

Top of Casing: 751.48

SITE NAME: PIEDMONT LANDFILL

LOCATION: KERNERSVILLE, NC

Drilling Summary:

Total Depth: 18.0 ft.
Borehole Diameter: 11.0 in.
Casing Stick-up Height: 2.90 ft.
Driller: Graham & Currie

Rig: CME-850
Bit(s): 6.25" I.D. HSA

Drilling Fluid: N/A

Protective Casing: 3.8' x 4.0" x 4.0" Anodized Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling HSA	10/21/94	09:04	10/21/94	11:08
Geophys. Logging:				
Casing:				
Filter Placement:	10/21/94	11:16	10/21/94	12:19
Bentonite Seal:	10/21/94	12:23	10/21/94	12:26
Development:	11/16/94	17:41	11/17/94	18:20

Well Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____
Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
____ - ____	C1	____ - ____
3.33 - +2.90	C2	745.25 - 751.48
17.03 - 3.33	S1	731.55 - 745.25
17.22 - 17.03	P1	731.36 - 731.55
____ - ____		____ - ____

Casing: C1 3.8' x 4" x 4" Anodized Aluminum
C2 2" I.D. Flush Threaded Sch. 40 PVC

Screen: S1 2.0" I.D. 0.010" Sch. 40 PVC

P1 2.0" I.D. PVC Plug

Filter Pack:
18.00 ft. - 3.33 ft. Medium Sand
3.33 ft. - 1.75 Fine Sand

Grout Seal: 0.50 ft. to 0.00 ft. Bentonite cement/grout

Bentonite Seal: 1.75 ft. to 0.50 ft. Bentonite pellets

Well Development:

11/16/94 17:41 - 20:09, Displacement Pump (0.8)
11/17/94 17:22 - 18:20, Displacement Pump (0.9)

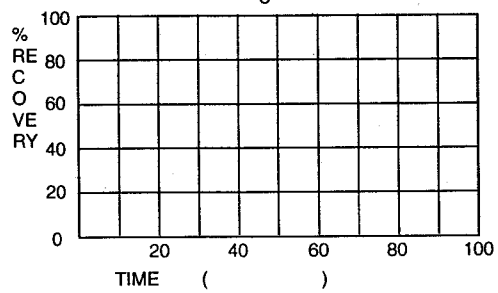
Total pumped approximately 170 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
11/16/94 18:41	6.14	129	15
19:10	5.98	129	15
19:54	6.24	127	15
11/17/94 18:11	6.15	126	15

Recovery Data: None

Q= S_o =



SUPERVISED BY: MIKE TAYLOR

DATE: 10/21/94

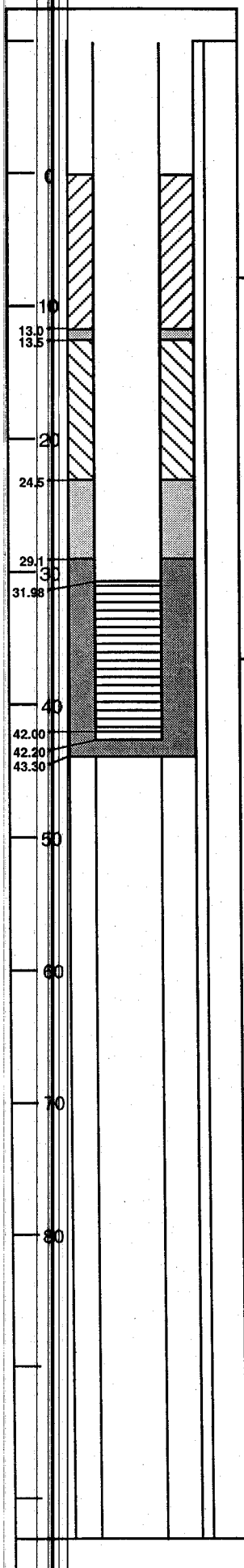
WC

Comments:

Surface seal = 3.0 ft. x 3.0 ft. x 3 in. Concrete pad with protective post.

Water did not clear up when developing well.

CWM Mont. Well



Well No.: MW-12D

Boring No. X-Ref: MW-12

MONITOR WELL CONSTRUCTION SUMMARY

Survey Coords: N891,007.53
E1,692,360.86

Elevation Ground Level: 748.73

Top of Casing: 751.53

SITE NAME: PIEDMONT LANDFILL

LOCATION: KERNERSVILLE, NC

Drilling Summary:

Total Depth: 43.3 ft.
Borehole Diameter: 11.0 in.
Casing Stick-up Height: 2.80 ft.
Driller: Graham & Currie

Rig: CME-850
Bit(s): 6.25" I.D. HSA

Drilling Fluid: N/A

Protective Casing: 5.0' x 4.0" x 4.0" Anodized Aluminum

Construction Time Log:

Task	Start Date	Start Time	Finish Date	Finish Time
Drilling 3 1/4" HSA	10/21/94	14:07	10/21/94	16:40
6 1/4" HSA	10/24/94	12:53	10/24/94	16:36
Geophys. Logging:				
Casing:	10/24/94	16:40	10/24/94	16:42
Filter Placement:	10/24/94	16:48	10/24/94	18:20
Bentonite Seal:	10/24/94	18:42	10/24/94	18:54
Development:	11/16/94	08:26	11/17/94	15:23

Well Design & Specifications

Basis: Geologic Log: X Geophysical Log: ____
Casing String (s): C = Casing S = Screen

Depth	String(s)	Elevation
-	C1	-
31.98 - +2.80	C2	716.75 - 751.53
42.00 - 31.98	S1	706.73 - 716.75
42.20 - 42.00	P1	706.53 - 706.73
-		-

Casing: C1 5.0' x 4" x 4" Anodized Aluminum
C2 2" I.D. Flush Threaded Sch. 40 PVC

Screen: S1 2.0" I.D. 0.010" Sch. Slot Sch. 40 PVC
P1 2.0" I.D. PVC Plug

Filter Pack:
43.3 ft. - 29.1 ft. Medium Sand
29.1 ft. - 24.5 Fine Sand
13.5 ft. - 13.0 Fine Sand

Grout Seal: 13.0 ft. - 0.0 ft. Bentonite cement/grout

Bentonite Seal: 24.5 ft. to 13.5 ft. Bentonite pellets

Well Development:

11/16/94 08:26 - 16:30, Displacement Pump (0.15)
11/16/94 17:30 - 19:52, Grundfos Pump
11/17/94 07:49 - 15:23, Displacement Pump

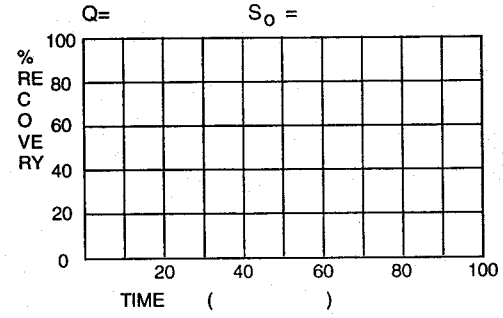
Total pumped approximately 170 gallons

Stabilization Test Data:

Time	pH	Spec. Cond.	Temp (C)
18:27	6.03		15
18:44	6.18	194	16
19:15	6.21	192	15
19:31	6.22	191	15

Recovery Data: None

Q= S_o =



SUPERVISED BY: MIKE TAYLOR

DATE: 10/24/94

WC

Comments:

Surface seal = 3.0 ft. x 3.0 ft. x 3 in. Concrete pad with protective posts.

Grundfos pump caused well to go dry fast at low pumping rates.

APPENDIX C
MONITORING WELL COMPLETION RECORDS

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANC P.O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center

PERMIT NO.: 34-6

ADDRESS: 9900 Freeman Road, Kernersville, NC 27284

OWNER (print): Waste Management of Carolinas, Inc.

DRILLING CONTRACTOR: Graham & Currie Well Drilling Inc.

REGISTRATION NO.: MW-10

Casing Type: PVC Sch. 40 dia. 2 in.
Casing Depth: from +3.00 to 22.00 ft. - dia. ____ in.
Screen Type: PVC Sch. 40 dia. 2 in.
Screen Depth: from 22.00 to 36.99 ft. - dia. ____ in.

Grout Depth: from 0.0 to 14.4 ft. - dia. 11"
Bentonite Seal: from 15.6 to 19.3 ft. - dia. 11"
Sand/Gravel PK: from 19.3 to 38.0 ft. - dia. 11"
Total Well Depth: from +3.00 to 37.1 ft. - dia. 11"

Static Water Level: 32.42 feet from top of casing Date Measured 11 / 15 / 94

Yield (gpm): N/A Method of Testing: N/A Casing is +3.00 feet above land surf

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION
0'	8'	Silt (ML) stiff brownish orange FILL
8'	35'	Silt (ML) stiff to very stiff brown orange, yellow, black mostly silt little clay SAPROLITE

LOCATION SKETCH

(show distance to numbered roads, or other map reference point

See attached location plan

REMARKS:

DATE: 12/16/94 SIGNATURE:

GWS 3187 (6/93)
Solid Waste Management Branch

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANC P.O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE:	PERMIT NO.:
Piedmont Landfill & Recycling Center	34-6
ADDRESS:	**OWNER (print):**
9900 Freeman Road, Kernersville, NC 27284	Waste Management of Carolinas, Inc.
DRILLING CONTRACTOR:	**REGISTRATION NO.:**
Environmental Construction Services Inc.	MW-11

Casing Type:	PVC Sch. 40 dia. 2 in.	Grout Depth:	from 0.0 to 12.2 ft. - dia.	8.5"
Casing Depth:	from +2.50 to 19.01 ft. - dia. ____ in.	Bentonite Seal:	from 12.7 to 17.1 ft. - dia.	8.5"
Screen Type:	PVC Sch. 40 dia. 2 in.	Sand/Gravel PK:	from 17.1 to 35.0 ft. - dia.	8.5"
Screen Depth:	from 19.01 to 34.00 ft. - dia. ____ in.	Total Well Depth:	from +2.50 to 34.2 ft. - dia.	8.5"

Static Water Level: 27.58 feet from top of casing Date Measured 11 / 18 / 94

Yield (gpm): N/A Method of Testing: N/A Casing is +2.50 feet above land surf

DRILLING LOG

DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
0'	13'	Sandy silt and silty sand (ML/SM) stiff/loose olive brown dry soils FILL
13'	35'	Silt (ML) predominately stiff mottled white black, orange silt to sandy silt SAPROLITE

LOCATION SKETCH

(show distance to numbered roads, or other map reference point

See attached location plan

REMARKS:

DATE: 12/16/94 SIGNATURE:

GW-32 (6/85)
N.C. Groundwater Management Branch

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANC P.O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center

PERMIT NO.: 34-6

ADDRESS: 9900 Freeman Road, Kernersville, NC 27284

OWNER (print): Waste Management of Carolinas, Inc.

DRILLING CONTRACTOR: Environmental Construction Services, Inc.

REGISTRATION NO.: MW-11D

Casing Type:	PVC Sch. 40 dia. 2 in.	Grout Depth:	from 0.0 to 74.4 ft. - dia. 8.5"
Casing Depth:	from +2.50 to 81.82 ft. - dia. ____ in.	Bentonite Seal:	from 75.0 to 80.0 ft. - dia. 8.5"
Screen Type:	PVC Sch. 40 dia. 2 in.	Sand/Gravel PK:	from 80.0 to 93.5 ft. - dia. 8.5"
Screen Depth:	from 81.82 to 91.79 ft. - dia. ____ in.	Total Well Depth:	from +2.50 to 92.0 ft. - dia. 8.5"

Static Water Level: 31.33 feet from top of casing

Date Measured 11 / 18 / 94

Yield (gpm): N/A Method of Testing: N/A

Casing is +2.50 feet above land surf

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION
0'	13'	Sandy silt and silty sand (ML/SM) stiff/loose olive brown dry soils FILL
13'	93.5'	Silt (ML) predominately stiff to hard mottled white, black, orange silt to sandy silt with few clay lenses SAPROLITE

LOCATION SKETCH

(show distance to numbered roads, or other map reference point

See attached location plan

REMARKS:

DATE: 12/16/94 SIGNATURE:

GW-3 (6/94)
Groundwater Management Branch

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N
DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANC
P.O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center

PERMIT NO.: 34-6

ADDRESS: 9900 Freeman Road, Kernersville, NC 27284

OWNER (print): Waste Management of Carolinas, Inc.

DRILLING CONTRACTOR: Graham & Currie Well Drilling Inc.

REGISTRATION NO.: MW-12

Casing Type: PVC Sch. 40 dia. 2 in.
Casing Depth: from +2.90 to 3.33 ft. - dia. ____ in.
Screen Type: PVC Sch. 40 dia. 2 in.
Screen Depth: from 3.33 to 17.03 ft. - dia. ____ in.

Grout Depth: from 0.0 to 0.5 ft. - dia. 11"
Bentonite Seal: from 0.5 to 1.8 ft. - dia. 11"
Sand/Gravel PK: from 1.8 to 18.0 ft. - dia. 11"
Total Well Depth: from +2.90 to 17.2 ft. - dia. 11"

Static Water Level: 6.02 feet from top of casing Date Measured 11 / 16 / 94

Yield (gpm): N/A Method of Testing: N/A Casing is +2.90 feet above land surf

DRILLING LOG

DEPTH FROM	DEPTH TO	FORMATION DESCRIPTION
0'	18'	Sandy silt, silty clay, silty sand (ML, CL, SM). Gradational between soil types and is dependent on weathering mottled brown orange white black SAPROLITE

LOCATION SKETCH

(show distance to numbered roads, or other map reference point

See attached location plan

REMARKS:

DATE: 12/16/94 SIGNATURE: ____________

DHS 3342 (6/85)
Solid & Hazardous Waste Management Branch

N. C. Department of Human Resources
Division of Health Services

WELL COMPLETION RECORD

COMPLETE ALL INFORMATION REQUESTED BELOW FOR EACH WELL INSTALLED, AND RETURN FORM TO THE N
DEPARTMENT OF HUMAN RESOURCES, SOLID AND HAZARDOUS WASTE MANAGEMENT BRANC
P. O. BOX 2091, RALEIGH, N.C. 27602

NAME OF SITE: Piedmont Landfill & Recycling Center

PERMIT NO.: 34-6

ADDRESS: 9900 Freeman Road, Kernersville, NC 27284

OWNER (print): Waste Management of Carolinas, Inc.

DRILLING CONTRACTOR: Graham & Currie Well Drilling Inc.

REGISTRATION NO.: MW-12D

Casing Type: PVC Sch. 40 dia. 2 in.
Casing Depth: from +2.80 to 31.98 ft. - dia. ____ in.
Screen Type: PVC Sch. 40 dia. 2 in.
Screen Depth: from 31.98 to 42.00 ft. - dia. ____ in.

Grout Depth: from 0.0 to 13.0 ft. - dia. 11"
Bentonite Seal: from 13.5 to 24.5 ft. - dia. 11"
Sand/Gravel PK: from 24.5 to 43.3 ft. - dia. 11"
Total Well Depth: from +2.80 to 42.2 ft. - dia. 11"

Static Water Level: 5.99 feet from top of casing
Date Measured 11 / 16 / 94
Yield (gpm): N/A Method of Testing: N/A
Casing is +2.80 feet above land surf

DRILLING LOG

DEPTH FROM	TO	FORMATION DESCRIPTION
0'	43.3'	Sandy silt, silty clay, silty sand silty gravel (ML, CL, SM, GM) Gradational between soil types and is dependent on weathering Mottled brown orange white black SAPROLITE

LOCATION SKETCH

(show distance to numbered roads, or other map reference point

See attached location plan

REMARKS:

DATE 12/16/94 SIGNATURE:

GW-3 (Rev 5)
Groundwater Management Branch

RUST ENVIRONMENT & INFRASTRUCTURE

Printed with soybean-based ink